

**A study of the correlation between length of limb
and height captured of *Eleutherodactylus
martinicensis*.**

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Abstract

On the island of Dominica there are several species of frogs including the tink frog, *Eleutherodactylus martinicensis*. Many frogs were captured and measured to discover if there was any correlation between length of limb and height captured. Some recordings were also taken of the frogs calls. This study has shown that there is no connection between height captured and length of limb.

Introduction

Dominica is an island located in the Lesser Antilles of the Caribbean between Guadalupe and Martinique. It is 754 square kilometers and has 148 kilometers of coastline. The climate is tropical with moderately warm temperatures during the summer months. This island is one of the few locations where the Tink frog, *Eleutherodactylus martinicensis*, can be found (Dominica, 2007). The tink frog is currently threatened by an exotic introduced species, *Eleutherodactylus johnstonei*. *Johnstonei* is encroaching upon *martinicensis* habitat and *martinicensis* are having difficulties recovering (Kaiser 1997). However, *johnstonei* have only been recorded between Fond Colet to Mahuat and up the Imperial Road up Antrim Valley to Springfield (Malhotra, Thorpe, 1999). Therefore, the majority of frogs located on Springfield Station should be *martinicensis*.

Eleutherodactylus spp. are tree frogs which makes them not dependant upon large bodies of water for reproduction. Therefore, it seemed relevant to see if there was any correlation between the height that the frogs were captured and their length of limb. I propose that such a connection exists.

30 frogs were captured and measured successfully. A few escapees managed to slip between our fingers and several were caught vocalizing on tape. None of the frogs that were captured or escaped were harmed or killed in the processes.

Materials and Methods

The items used for the capture and measuring of the tink frogs were: an aquatic dip net, a long handled butterfly net, many pairs of hands, lights (either flashlight or headlamp), a 12inch/30cm ruler, Raven 2.1 technology, Marantz portable cassette recorder with a Cardioid microphone.

After dinner, usually around 9pm, GMT -4, a group of students would go out and locate tink frogs by their call. They would then record the height of the frog and capture it, then bring it back to be measured by myself. The measurements were taken in centimeters on a centimeter ruler. Snout to vent length, foreleg, and hind leg length were all taken by a single person to avoid measuring discrepancies. On the legs, the right foreleg and the right hind leg were the ones measured. After being measured, the frogs were held in containers until the catching was finished for the night, when they were then released. Some of the frogs were recorded calling by Dr. Jim Woolley using the Marantz recorder. Those calls were then visualized using Raven software.

Results

The 30 frogs captured and measured are organized by the height at which they were first seen. Table 1 shows this information from lowest height (-0.25m) to highest height (1.5m). Figure 1 corresponds to all of the frogs captured at a height of 0.25m and each vertical series of data points is an individual frog (the first data points are for the

first frog in that height section, the second data point, the second frog, and so on). Figure 2 corresponds to all frogs captured at a height of 0.5m. Figure 3 corresponds to all frogs captured at a height of 1m. Figure 4 corresponds to all of the frogs captured at a height of 1.5m. Table 2 takes the averages of the individual measurements for SVL, foreleg, and hind leg, separated by height.

Table 1. Measurements of Individual Frogs by Height

Frog	SVL (mm)	Foreleg (mm)	Hind leg (mm)	Height above ground (m)
#24	21	11	32	-0.25
#1	22	12	30	0.25
#2	26	15	39	0.25
#3	28	15	40	0.25
#4	27	13	38	0.25
#5	22	11	37	0.25
#7	25	13	36	0.25
#9	23	13	33	0.25
#10	24	13	33	0.25
#16	32	13	41	0.25
#17	27	16	40	0.25
#28	31	17	42	0.25
#29	23	12	32	0.25
#30	25	13	36	0.25
#8	25	11	31	0.5
#11	22	12	33	0.5
#12	25	15	37	0.5
#13	23	15	36	0.5
#14	21	13	32	0.5
#15	41	23	52	0.5
#18	23	14	33	0.5
#19	23	13	32	0.5
#6	21	12	28	1
#21	23	13	32	1
#22	24	12	31	1
#25	24	12	30	1
#26	24	14	34	1
#27	23	12	30	1
#20	28	19	44	1.5
#23	29	13	34	1.5

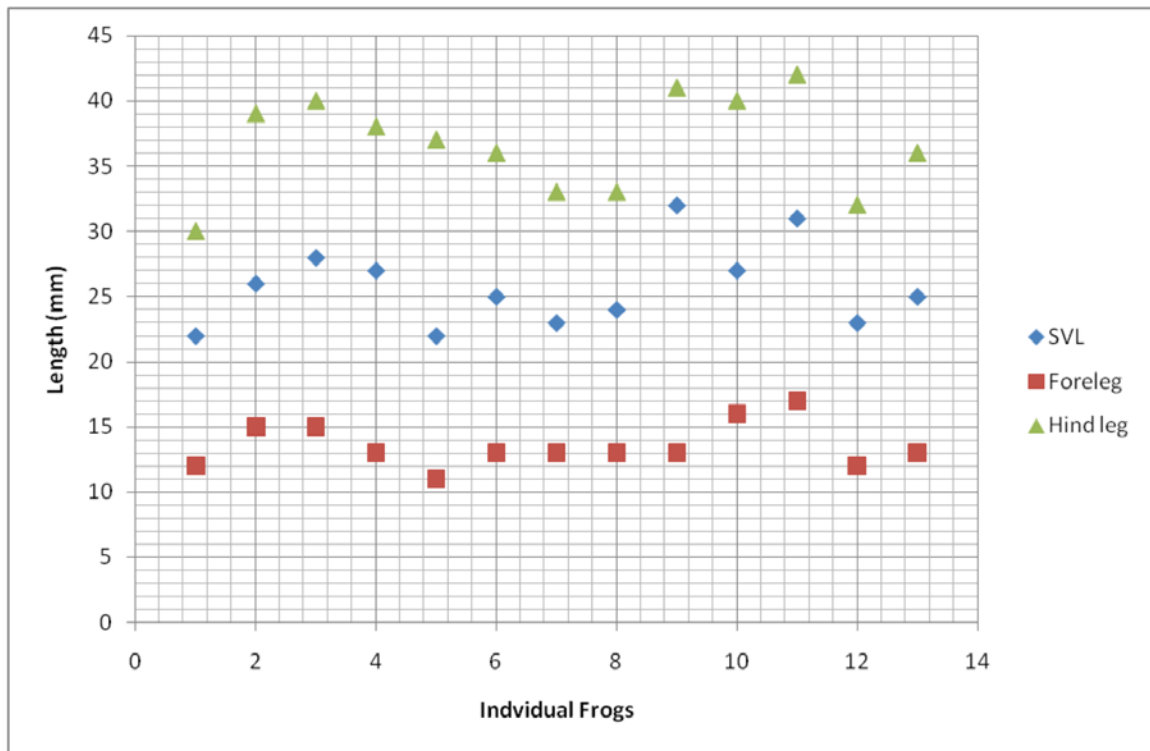


Figure 1. Frogs captured at .25 meters. (1, 2, 3,... correspond to the frog listed 1st, 2nd, 3rd,... in Table 1 for the height of .25m)

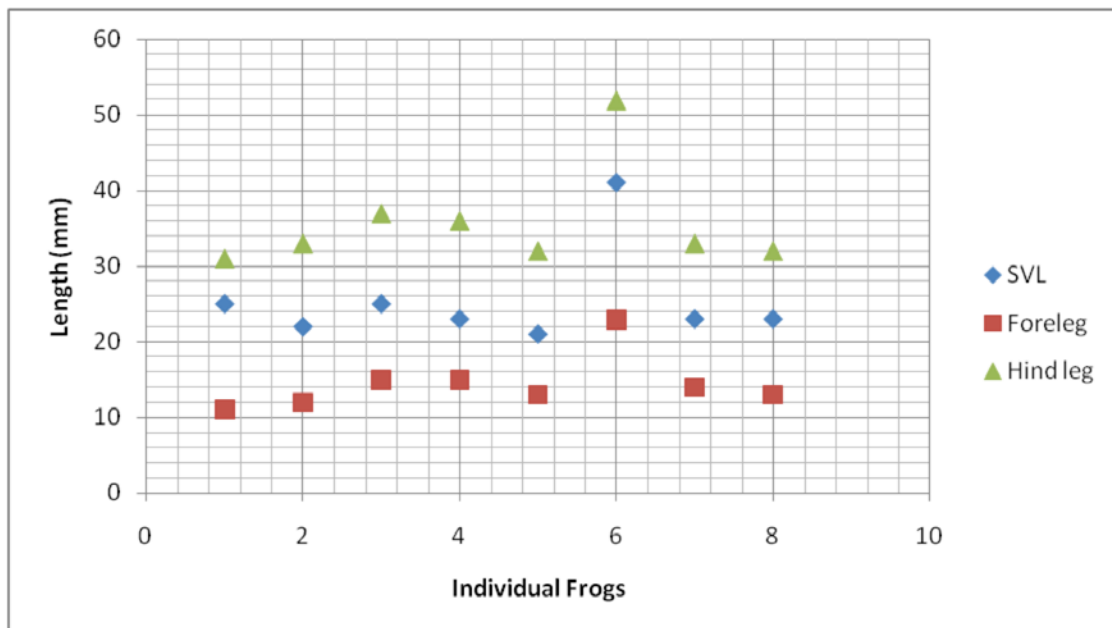


Figure 2. Frogs captured at .5 meters. (1, 2, 3,... correspond to the frog listed 1st, 2nd, 3rd,... in Table 1 for the height of .5m)

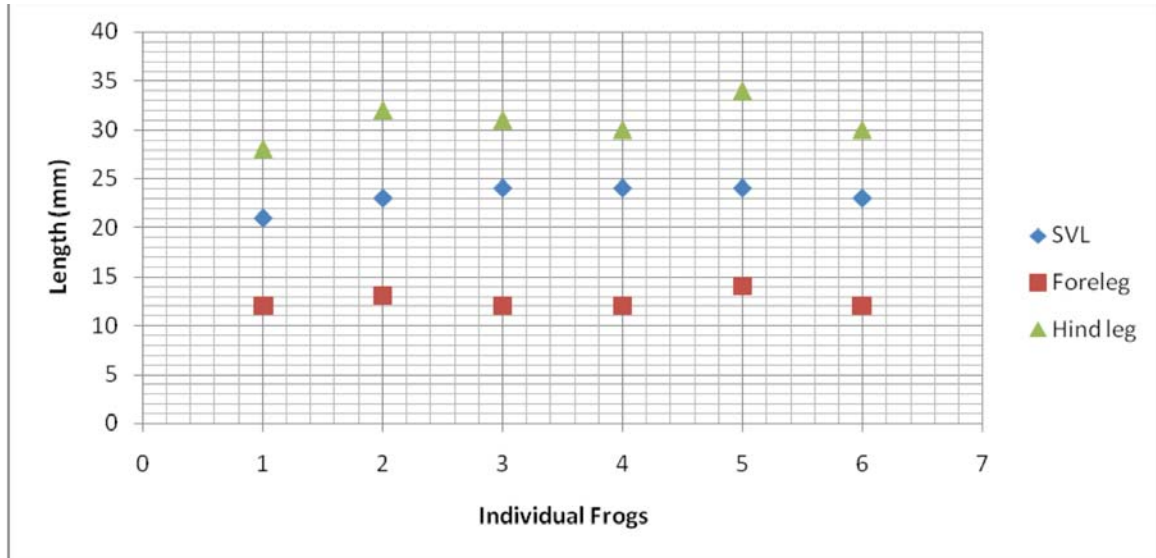


Figure 3. Frogs captured at 1 meter. (1, 2, 3,... correspond to the frog listed 1st, 2nd, 3rd,... in Table 1 for the height of 1 m)

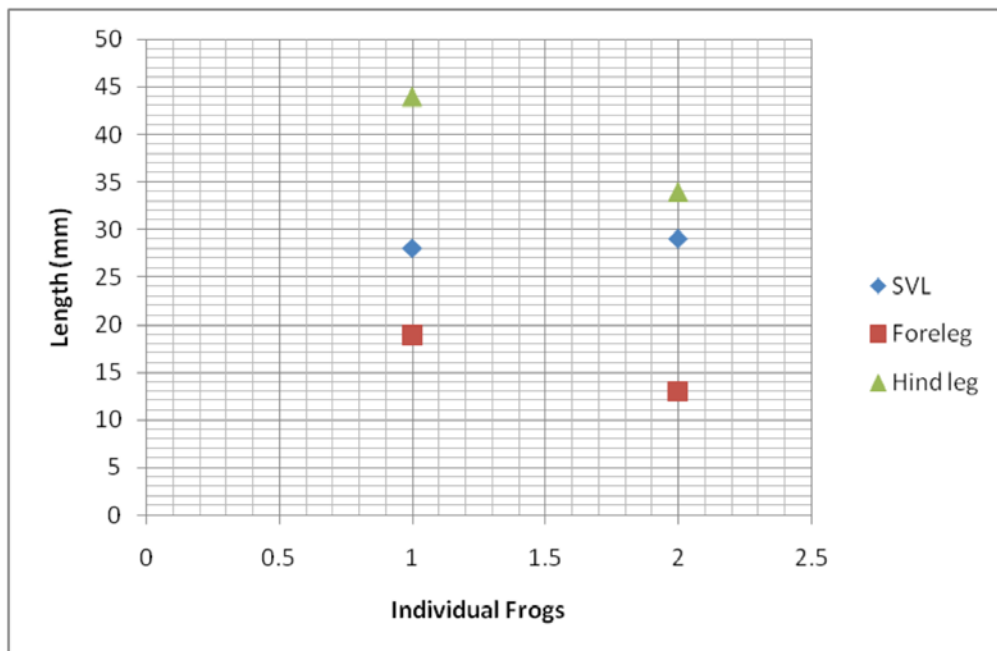


Figure 4. Frogs captured at 1.5 meters. (1, 2, 3,... correspond to the frog listed 1st, 2nd, 3rd,... in Table 1 for the height of 1.5m)

Table 2. Average lengths by height.

Height above ground (m)	Average (SVL)	Average (foreleg)	Average (hind leg)
-0.25	21.00	11.00	32.00
0.25	25.77	13.54	36.69
0.5	25.38	14.50	35.75
1	23.17	12.50	30.83
1.5	28.50	16.00	39.00

Discussion

The data collected from the 30 frogs does not show a correlation between height captured and length of limb. Table 2 shows that the average at 1m is smaller than the averages at 0.25, 0.5, and 1.5m. Thus length of limb neither gradually increases nor decreases as height increases and there is no correlation between these two factors. However, an interesting note shown by Figures 1-4 is such that larger frogs have longer limbs, proportionally.

One item that could have made the measurements more accurate would have been using a Vernier Caliper instead of a 30cm ruler. A possible inaccuracy of the measurement of the frogs could also be attributed to the fact that we went hunting at night and people are not as tall as the tree frogs like to climb. Therefore, we were unable to obtain measurements for the frogs calling in the tops of the trees,.

Also, *Eleutherodactylus martinicensis* has an extremely large variety of color patterns and, therefore, makes them difficult to identify from other species of *Eleutherodactylus*. According to Schwartz and Henderson (1985), *martinicensis* has a single broad crural crossbar, bordered by paler, and *johnstonei* has a median pale dorsal hairline. Figure 5 has both of these characteristics.



Figure 5. *Eleutherodactylus martinicensis*, Photo taken by Dr. Jim Woolley.

Figure 6 has some physical characteristics of *amplinympa* yet the vocalizations of *martinicensis*.



Figure 6. *Eleutherodactylus spp*, Photo taken by Dr. Jim Woolley.

Hence, identification based solely upon physical characteristics is nigh impossible. Therefore, we based our identifications upon vocalizations as described by Malhotra and Thorpe (1999). We recorded a number of individuals with the Marantz recorder and used Raven 2.1 software to visualize the sound into pitches and waves.

Figures 7-10 are frogs that we recorded and by their vocalization, identified them as *martinicensis*.



Figure 7. Frog 1. Photo taken by Dr. Jim Woolley.



Figure 8. Frog 2. Photo taken by Dr. Jim Woolley.



Figure 9. Frog 3. Photo taken by Dr. Jim Woolley.



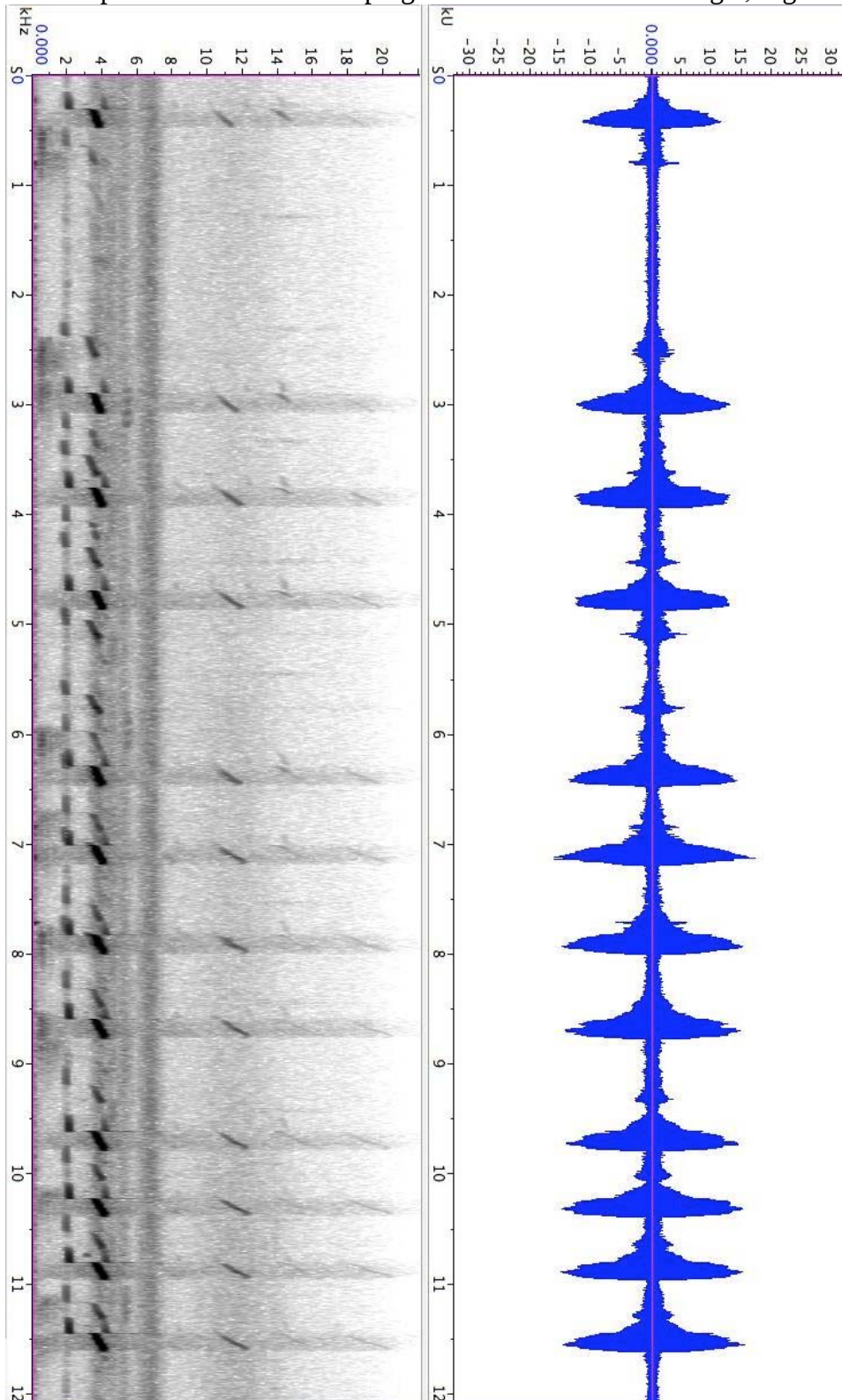
Figure 10. Frog 4. Photo taken by Dr. Jim Woolley.

Conclusion

The frogs in this study have shown that there is no correlation between height captured in vegetation and length of limb. However there is a relationship between size of frog and length of limb; larger frogs have longer legs. Also, the keys to differentiate the species of frogs on Dominica are not accurate because of the extremely large variance of color pattern within one species.

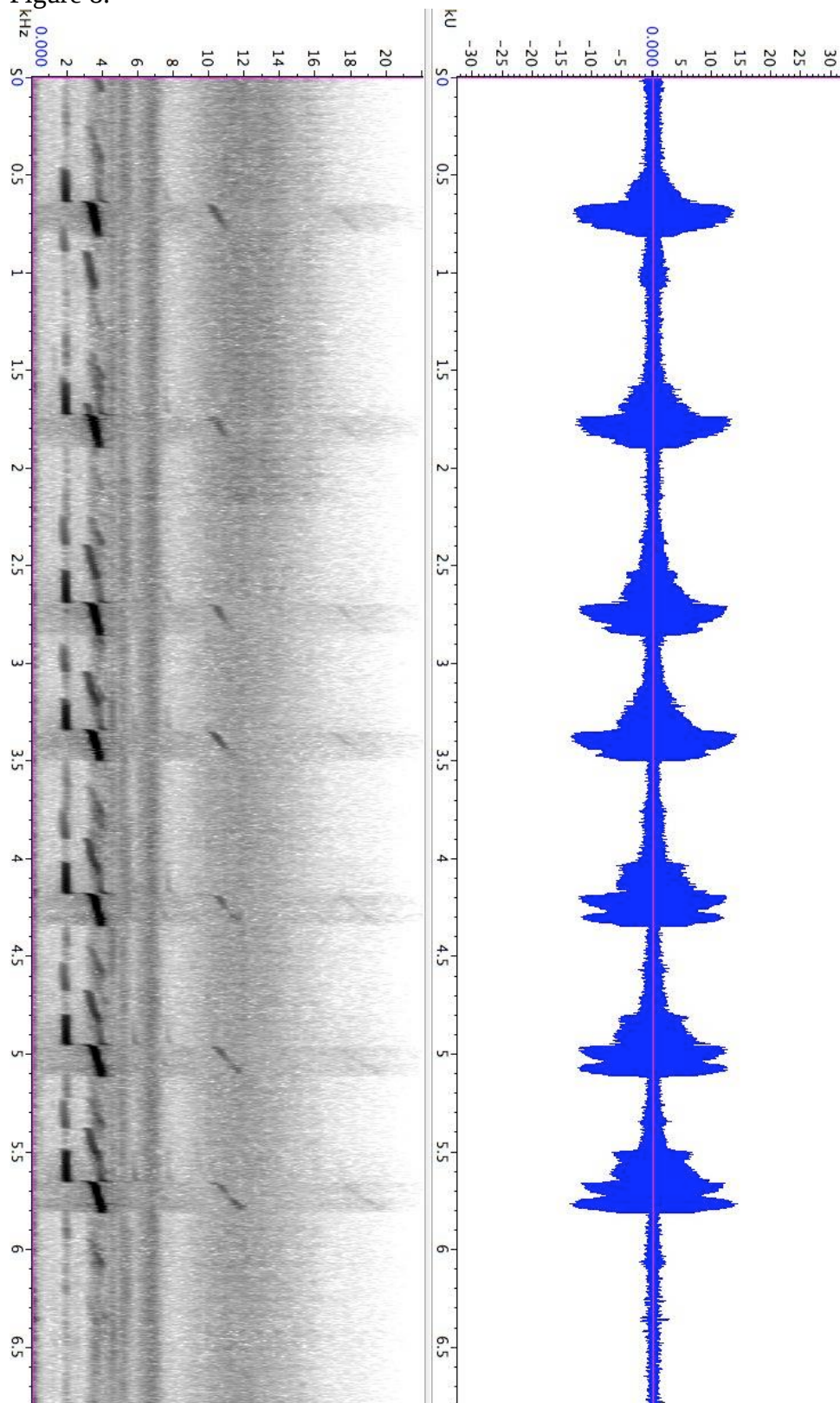
Appendix A

These are the sonogram recordings of frogs 1-4 in Figures 7-10. Sonogram 1 is an example of the two tone weeping sound associated with frog 1, Figure 7.



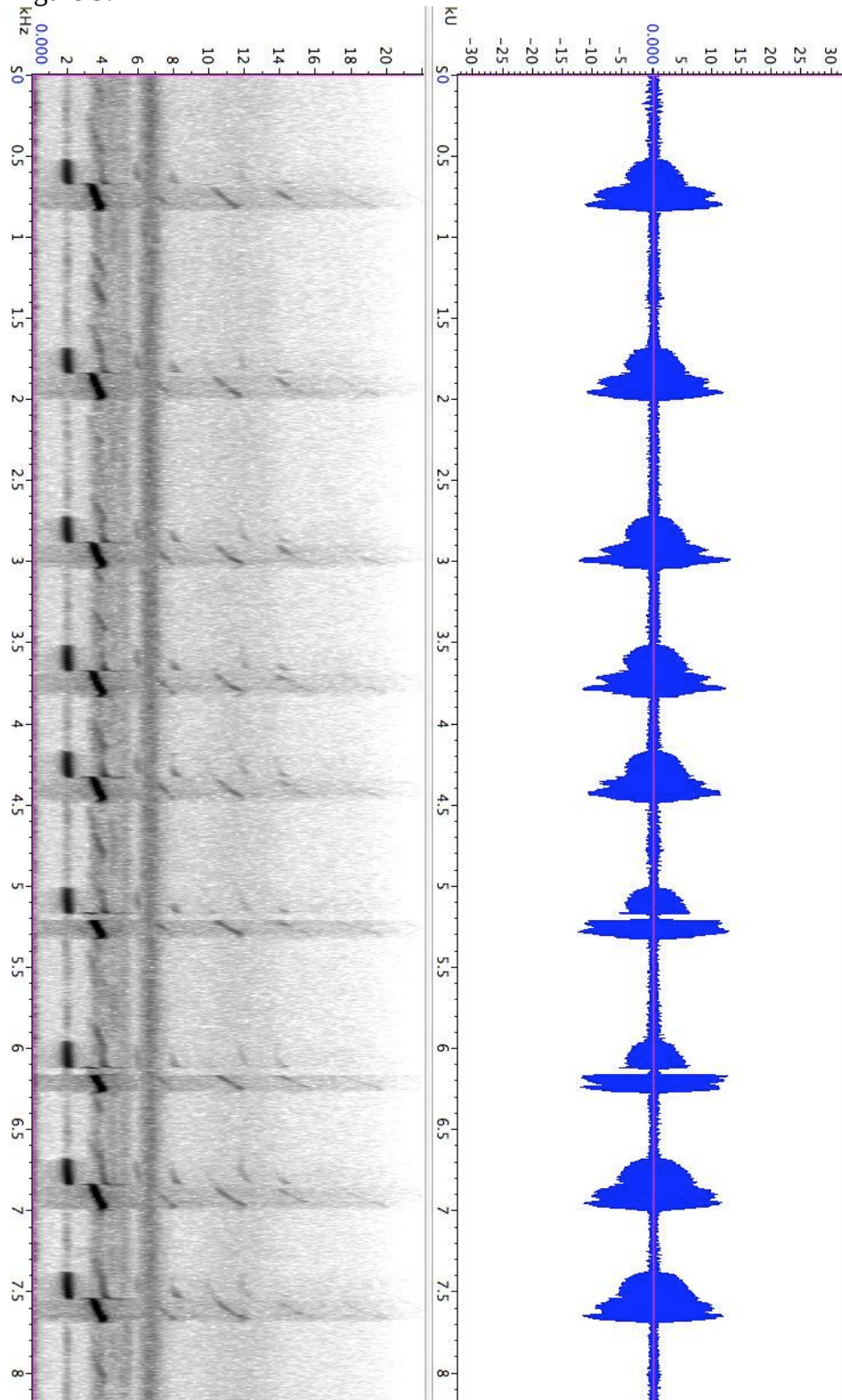
Sonogram 1. Associated with frog 1 in Figure 7.

Sonogram 2 is an example of the two tone weeping sound associated with frog 2 in Figure 8.



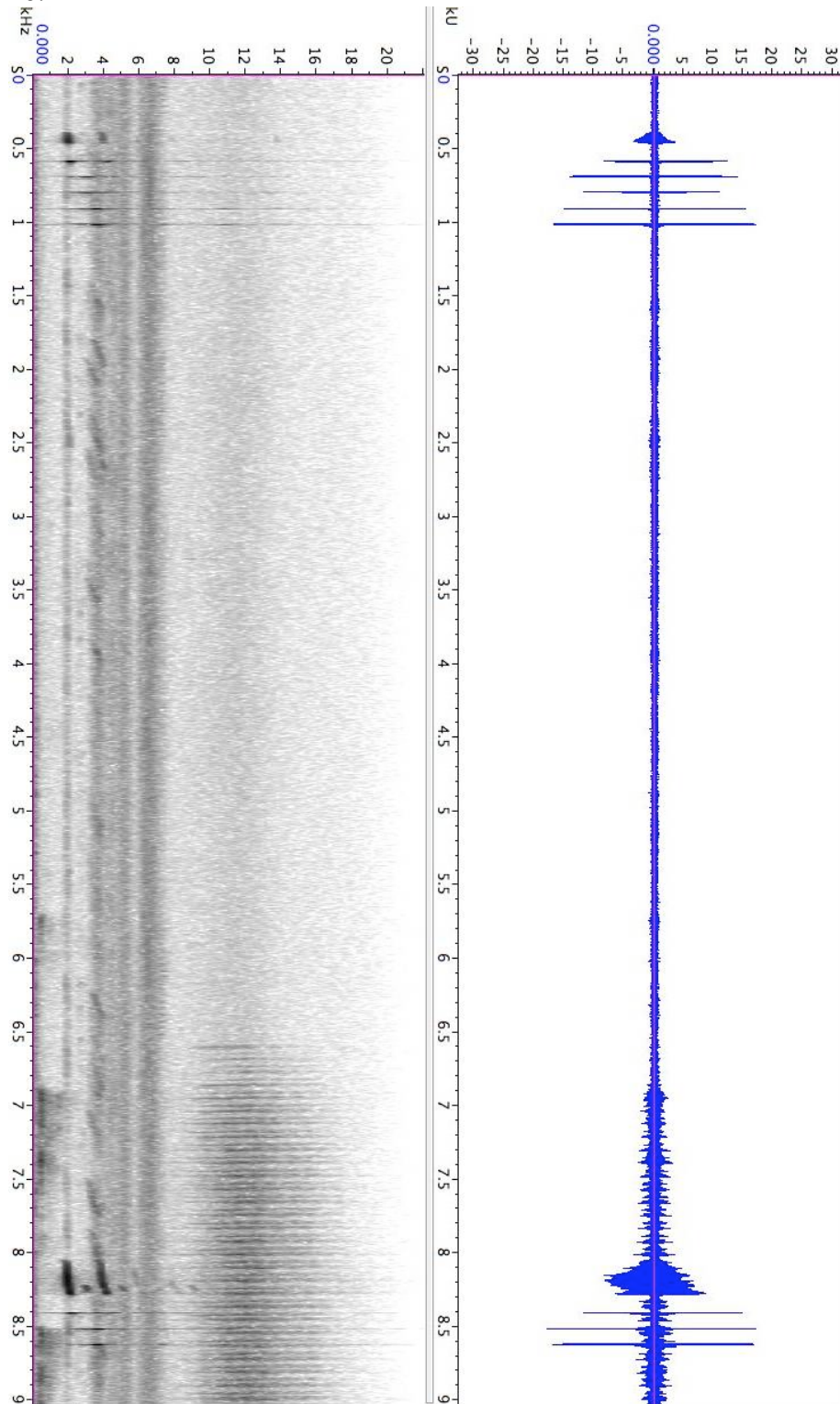
Sonogram 2. Associated with frog 2, Figure 8.

Sonogram 3 is an example of the two tone weeping sound associated with frog 3 in Figure 9.



Sonogram 3. Associated with frog 3, Figure 9.

Sonogram 4 is an example of a tone plus clicking sound associated with frog 4 in Figure 10.



Sonogram 4. Associated with frog 4, Figure 10. The small amplitude marks on the second call are not from the frog recorded. They are from a dog barking in the background. Therefore, the first call is more representative.

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